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UNITED STATES PATENT APPLICATION

FOR

INTERNET DOMAIN AND TIME INDEX BASED VIDEO EMAIL SYSTEM

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BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

This invention relates to video on demand (VOD) systems, and more particularly to emailing indexes of VOD program content.

BACKGROUND INFORMATION

With the evolution of video and other media towards video on demand (VOD), distribution of television (TV) content is changing. In one scenario, VOD systems may incorporate streaming of "library" files that contain TV programs, Karaoke files, music, etc. These files may likely be fairly large, depending on the quality of the file. A content provider will store all of the supplied content on a database. Any user wanting to view a TV broadcast needs to establish a connection between their viewing device and the provider's server. The video server sends the content, in a compressed form, to a viewing device, such as a set-top box (STB) connected to a video display device, such as a monitor or television. The STB would then decode the content and transmit the decoded content to the video display device.

The user's STB would be capable of storing part or all of a TV program in a memory. The user can select any movie or program from a selection menu, and retain complete video stream control. Making use of non-linear digital editing, or non-sequential access, the user will then be able to "slow rewind," "fast rewind," "slow forward," "fast forward," or "pause" the viewing of the program. Because of the size of the viewing program, and due to intellectual property rights of the owners of the content, saving or copying a content for later viewing by others may not be practical, and may result in violation of intellectual property laws.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates an embodiment of the invention including an index memory coupled to a set-top-box (STB) processor.

Figure 2 illustrates an index memory device of an embodiment of the invention.

5 **Figure 3** illustrates a graphics overlay screen for an embodiment of the invention.

Figure 4 illustrates a system of a plurality of embodiments of the invention having an index memory coupled to a STB at different venues coupled to a video-on-demand (VOD) service provider.

Figure 5 illustrates a graphics overlay screen of an embodiment of the invention having email capability for attaching encoded VOD segment representations.

Figure 6 illustrates a graphics overlay screen of an embodiment of the invention having basic email functionality.

DETAILED DESCRIPTION

The invention generally relates to a method and apparatus for creating audio/video command strings to eliminate the copying and transmission of large audio/video data streams. Referring to the figures, exemplary embodiments of the invention will now be described. The exemplary embodiments are provided to illustrate the invention and should not be construed as limiting the scope of the invention.

Figure 1 illustrates a system for receiving, viewing, recording, saving, sending information relating to video on demand (VOD) formatted streams. System 100 in **Figure 1** includes a set-top box (STB) processor 110, a user controller 120, communications channel 130, content index memory 140, content decoder 150, video/audio formatting module 160, and video/audio device 170. STB processor 110, may include, but is not limited to, a central processing unit (CPU), read and write memory (RAM), and read only memory (ROM) components. User controller 120 can be a infrared remote control, keyboard or computer mouse. One skilled in the art will recognize that user controller 120 may be any type of controller capable of receiving user commands, such as a voice activated controller. Communications channel 130 is the connection to a VOD service provider. Communications channel 130 could be a satellite connection, cable connection, or any other state of the art connection. Index memory 140 stores VOD content indexes, such as content ID, start time of a user selected segment of a VOD decoded stream, and stop time of a user selected segment of a VOD stream. Index memory 140 can be a non volatile read and write memory (NVRAM) or any other similar state of the art memory device available. Content

decoder 150 decodes the VOD stream received from a provider in a compressed format.

Video/audio formatting 160 arranges the VOD decoded stream into a stream that can be viewed and heard on video/audio device 170. Video/audio device 170 can be any device capable of being viewed and heard by a user, such as a television, stereo, or
5 computer system.

In one embodiment, a user can select a segment of a VOD stream to record and save an encoded segment identifying indexes, such as beginning and ending of a stream that is currently or has been viewed by the user. By recording and saving only encoded indexes, very little storage space is used, and the VOD stream is not duplicated which, prevents infringing intellectual property laws. A scenario will be presented to illustrate the use of this embodiment.

Assume a first user has selected to view a VOD program. After the user selected the desired program, the stream is sent from the provider to the users STB system. The user can then view the decoded VOD program whenever she chooses. With use of non-sequential editing features, the user can pause, rewind, fast forward, or play the VOD program as desired. In this scenario, after the first user views the VOD program, the user believes that a segment of the content would be of interest to a second user. Therefore, the first user accesses the VOD program, rewinds to the desired segment, and records the segment that she believes would be of interest to the second user.

Assuming there are multiple segments of the VOD program that would be of interest to the second user, the first user repeats the recording for a multiplicity of segments. When the second user is available to view the recorded segments, the second user can choose any one of the recorded segments to begin viewing the content of the VOD

program. Thus, in one embodiment, because of the large amount of memory that would be required to store a complete recording of a plurality of segments, the recording of the segment only includes indexing of the segment(s).

Indexing of a segment of a VOD program is represented in a unique sequence of bytes. For example, assuming a user is viewing a Cable News Network (CNN ©) VOD program on February 15, 2000. The user selects to record a segment of the VOD program at 5:10PM, and the user selects to stop recording a segment of a VOD program at 5:12PM. STB processor 110 converts the VOD program identifier (ID) for the program selection into a string of text characters, e.g., "CNN February 15 2000." The string of text characters is then converted by STB processor 110 into a unique 32-bit identifier. In another embodiment, the unique identifier is retrieved from the service provider by STB processor 110. The unique identifier along with the start and stop indexes are then stored into index memory 140. In one embodiment, the start and stop indexes are stored in 1/4 second intervals. One skilled in the art will note that other timing intervals can be used, such as 1/8 second intervals. For the above example, a 10 byte sequence of 4838A5B7 03C5A0 03C780 is stored representing a first recorded segment which, is illustrated in **Figure 2** as segment 210. The 4838A5B7 bytes represent a unique ID for CNN © February 15, 2000. The 03C5A0 bytes represents the recording start-time, 17 hours and 10 minutes (5:10 PM), and the 03C780 represents the recording stop-time, 17 hours and two minutes (5:12PM), in 1/4 second intervals.

Assume the user selects a second content segment of the VOD program to record. In this instance, the user selects to begin recording the same VOD program at 5:15 PM, and stops recording at 5:22PM. The same sequence takes place, and the second recorded

segment indexes are stored in index memory 140 as segment 220. In this instance, a 10 byte sequence, 4838A5B7 03CA50 03D0E0 is the representation for the second recorded segment. As before, the 4838A5B7 bytes represent a unique ID for CNN © February 15, 2000. The 03CA50 bytes represents the recording start-time, 17 hours and 15 minutes (5:15 PM), and the 03CD0E0 represents the recording stop-time, 17 hours and twenty-two minutes (5:22PM), in 1/4 second intervals. Of course, the user can continue to record segments, before, after, or during the above recorded segments by rewinding, fast-rewinding, forwarding, or fast-forwarding the VOD program to a specified segment for the recordation of segment indexes. The user can optionally enter a customized identifier to be associated with the recorded segment. The customized identifier is entered by user controller 120. For example, a customized identifier can be entered as "Mary please see this CNN © piece." This identifier is displayed as illustrated in **Figure 3**.

The recorded segment representations can then be accessed by the user or an additional user(s) as long as the recorded segment representations are available in index memory 140, i.e. not deleted or erased. Assuming now that an additional user wishes to view a pre-recorded segment that is stored in index memory 140. This user selects a program to view, in this example CNN © February 15, 2000. STB 100 converts the selection to a string of text, e.g. "CNN February 15, 2000." Next, STB 100 converts the string of text into a unique 32-bit identifier, or receives an identifier from the VOD service provider. STB 100 searches index memory 140 for a match to the unique identifier. In this example, the search will result in two matches, segments 210 and 220. The STB includes the two segments 210 and 220 in a user selection option list that is

displayed on the users video device 170. An example option list is illustrated in **Figure**

3. The user option list can be any appropriate graphics overlay representation of user options.

Assuming the user selects segment 220 as their program choice by using user
5 controller 120, STB 100 then retrieves the information contained in segment 220 from
index memory 140. STB 100 converts the segment 220 to an order and sends a request
to the service provider. In one embodiment, the order is represented as "CNN
February 15 2000 03CA50 F0." This VOD program order represents 60 seconds (F0 in 1/4
second interval) of the segment content starting at 17 hours and 15 minutes (5:15 PM).
Assuming the VOD program is still available at the service provider, the VOD service
provider delivers the requested order to STB 100, where it is decoded by content decoder
150, formatted by video/audio formatting 160, and then displayed on video/audio
device 170. After part of the selected segment has been viewed by the user, such as the
first 30 seconds, STB 100 places an order with the service provider for the next 60
seconds of the selected segment 220. In this embodiment, the order is represented as
"CNN February 15 2000 03CB40 F0." The service provider then delivers the next 60
seconds of the selected segment 220. This repeats until all of the full seven minutes of
segment 220 is displayed for the viewer.

Therefore, in as little as 10 bytes of memory storage for each recorded segment
20 representation, the emulation of millions of bytes worth of VOD programming content
is realized. For example, with only 12K bytes of memory used in index memory 140,
over a thousand pre-recorded segments can be represented, without having to make
complete copies of program content.

In another embodiment, STB 100 can forward the represented segments by electronic mail (email) to another user. **Figure 4** illustrates a typical network of users having STB's and a VOD service provider. The user selects the program or pre-recorded segment, as described above, and selects email, as illustrated in **Figure 5**. STB 100 then prompts the user to enter the email address to forward the program or segment, as illustrated in **Figure 6**. The user can then access a typical email program having subject, recipients, and message entries. STB 100 then converts the program or segment into an order, as described above, and attaches the order to the email. Assuming the recipient has a similar STB and provider service, the recipient opens the received email, and the STB processes the attachment, and stores the represented segment or program in index memory 140. Assuming the represented segment or program is available at the service provider, the recipient can select the pre-recorded segment or program, as described above, and view the content.

Therefore, the sender has not copied the VOD content when attaching to an email. This embodiment can be useful for educational purposes as well. Teachers, professors, employers, friends and family members can send and receive VOD represented segments and programs that are of interest. And, the recipient and sender do not have to copy an entire segment or program. Thus, avoiding intellectual property infringements and reducing the memory size necessary for storage of segments and programs.

The above embodiments can also be stored on a device or medium and read by a machine to perform instructions. The device or medium may include a solid state memory device and/or a rotating magnetic or optical disk. The device or medium may

be distributed when partitions of instructions have been separated into different machines, such as across an interconnection of computers.

While certain exemplary embodiments have been described and shown in the accompanying drawings, it is to be understood that such embodiments are merely
5 illustrative of and not restrictive on the broad invention, and that this invention not be limited to the specific constructions and arrangements shown and described, since various other modifications may occur to those ordinarily skilled in the art.

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